1/14/04 PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	John Vigurs CURZON, Peter Ralph COLLINS and Andrew James BUTLER-MILES
Serial no.	:	10/696,382
Filed	:	October 29, 2003
For	:	METHOD AND APPARATUS FOR A SENSORY SYSTEM
Group Art Unit	:	
Examiner	:	
Docket	:	ROCKCO P63AUS

The Commissioner for Patents
U.S. Patent & Trademark Office
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Dear Sir:

A claim for priority is hereby made under the provisions of 35 U.S.C. § 119 for the above-identified United States Patent Application based upon United Kingdom Patent Application No. 0225242.7 filed October 30, 2002. A certified copy of said United Kingdom application is enclosed herewith.

In the event that there are any fee deficiencies or additional fees are payable, please charge the same or credit any overpayment to our Deposit Account (Account No. 04-0213).

Respectfully submitted,

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I hereby certify that this correspondence is being deposited with the United States Postal Service, with sufficient postage, as First Class Mail in an envelope addressed to: Director of the United States Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. January 14, 2004.

By: _____
Print Name: Michael J. Bujold

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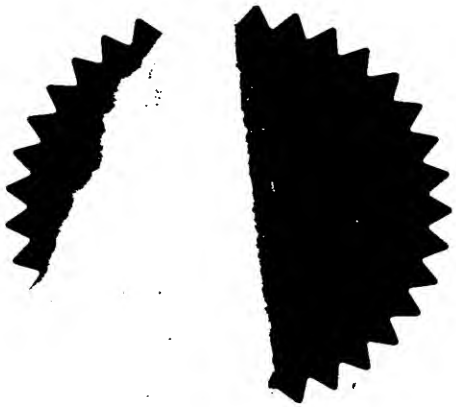

Signed

Dated 11 November 2003

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(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

30 OCT 2002

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Cardiff Road
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1. Your reference

AIRDRI/SSLD

30OCT02 E759705-1 D02682

2. Patent application number
(The Patent Office will fill in this part)

0225242.7

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

Airdri Limited
Technology House
Oakfield Estate
Eynsham
Witney OX29 4AQ

Patents ADP number *(if you know it)*

5850516004

If the applicant is a corporate body, give the country/state of its incorporation

UK

4. Title of the invention

Sensory system for a lift door

5. Name of your agent *(if you have one)*

Olaf C Rock
Rock and Company
Trelawn
Cassington
Witney
OX29 4DN

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

Patents ADP number *(if you know it)*

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6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day / month / year)*

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*

a) any applicant named in part 3 is not an inventor, or
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Continuation sheets of this form	
Description	5
Claim (s)	—
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Drawing (s)	1 only

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Priority documents	
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Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	
Request for preliminary examination and search *(Patents Form 9/77)*	
Request for substantive examination *(Patents Form 10/77)*	
Any other documents *(please specify)*	

11. I/We request the grant of a patent on the basis of this application.

Signature [signature] Date 30/10/2002

12. Name and daytime telephone number of person to contact in the United Kingdom

Olaf C Rock 01865 880389

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METHOD AND APPARATUS FOR A SENSORY SYSTEM

This invention relates to method and apparatus for a sensory system. It is particularly, but not exclusively, intended for use in relation to a lift or elevator.

In providing a sensory system for a lift there is a need to ensure safe operation of the system as a whole. This would include regulating opening and closing of doors of a lift door of a car so that in operation they do not hazard anyone entering or leaving the car. There have in the past been provided a number of systems seeking to control door operation which have varied in effectiveness and complexity.

According to a first aspect of the present invention there is provided a method of sensory system for the control of a lift car located in an lift shaft which serves to define a number of separate stations between which the car can be driven and at each of which stations the car can be caused to stop to enable a person or an article to enter or leave the car characterised by the steps of:

1 providing for the car a scanning device;

2 providing at each of at least two or more of the stations an independent scanning extension means;

3 providing that on, or following, the arrival of the car at one of the stations equipped with an scanning extension means the scanning device and the scanning extension means at the station are juxtaposed, or otherwise linked, to form an operable combination;

4 scanning by means of the operable combination a predetermined region associated with the shaft at the station so as to provide as an output a signal representing a state of the predetermined region, such as whether it is occupied or not, and

5 using the signal or a function thereof, in the event the signal or a function thereof represents a predetermined condition, to regulate subsequent operation of the lift car.

According to a first preferred version of the first aspect of the present invention the

scanning step is undertaken by way of a scanning device embodied as a camera and a scanning means incorporating a refractive or a reflective component to provide for a view of the pre-determined area to be conveyed by way of the scanning means to the scanning device.

According to a second aspect of the present invention there is provided a lift system wherein an lift car is located in a lift shaft which serves to define a number of separate stations at each of which the car can be caused to stop to enable a person to enter or leave the car characterised by the provision of a scanning device supported on, or by, the car, and a scanning extension means which, at least when the car is stopped at a given station, is juxtaposed or otherwise linked to the scanning device to provide a combination unit directed to a predetermined region relative to the given station whereby the scanning device is adapted to provide on an output channel of a signal representing a state of the predetermined region.

According to a first preferred version of the second aspect of the present invention the scanning device is a camera and the scanning extension means incorporates a refractive or a reflective component whereby a view of the pre-determined area is conveyed by way of the scanning means to the scanning device..

An exemplary embodiment of the invention will now be described wit reference to the accompanying drawings comprising a diagrammatic view of a lift system.

In this case the lift car described is one is moved by a traction system making use of a hoist and cable. However the system is equally applicable to hydraulically powered lift systems.

The drawing shows a lift shaft 11 having a lift car 12 with a car door 13. The lift car 12 is displaced by means of a hoist 14 and cable 14A so that the car 12 can be raised or lowered to align with any one of five floors, respectively floors 15 to 19, to which access to and from the lift car 12 can be gained by means of openings 11A – 11E which open, respectively, onto floors 15 to 19 through lift shaft wall 20. Each opening 11A – 11E is closed by a conventional door (not shown for the sake of clarity) which in normal

operation is closed except when the lift car 12 is decked at the opening and the car door 13 is open.

Each floor 15 – 19 has an access region, respectively access regions 15A – 19A, situated immediately in front of the openings 11A – 11E. People waiting for, or entering or leaving the lift car 12 at a given floor must necessarily occupy or pass through the corresponding access region for that floor. This region 17A can extend partway into the lift to include the area between the doors.

The hoist 13 is governed by means of a control system which has components and circuitry located in the car 12, at various points in the shaft 11 and in the region of the hoist 13. In the lift car 12 the control system includes a digital camera 21 with its lens 22 directed outwardly towards the wall 20 of the lift shaft 11.

At each floor 15 – 19 in wall 20 there is provided a lens unit, respectively lens unit 15L – 19L. When lift car 12 is decked at a given floor, in this case floor 17 is shown, the camera 21 is aligned with the lens unit 17L so as to act as an operable combination providing for the scanning of the access region 17A.

The combination serves to generate a signal representing a predetermined status for the access region 17A (for example nobody waiting, several waiting or a non-standard operating situation such as light failure, or whatever). The control system then establishes the required operating behaviour of the system. Typically the control system provides for the closure of the car door 13 and of the floor door in opening 11C given that the camera 21 does not detect the presence of individuals moving into or out of the car 12. In addition gap sensing means can be used to establish that there are no obstructions in the path of a closing door.

By using an operable combination involving the use of a single camera in the car 12 and a separate scanning extension for each floor (lens units 15L to 19L) an effective operating system can be readily installed able to sense a variety of operating conditions and to provide for the operation of a control system of providing enhanced user safety. The proposed system can be installed in new and existing lift systems.

The above exemplary embodiment involves camera system is located on the car and the lens part on each landing. This means that to be functional at each landing only the lens part need be replicated. This has the practical advantages of reduced installation time, reduced cost and higher reliability. The system can also be installed retrospectively. When the lift stops at any given landing, the system parts at that floor become uniquely combined with the parts on the car for function at that floor. Typically the combination can be made up of a minimal refractive and/or reflective conditioning element (lenses/mirror) at each landing and the camera and processing system (backend) on the car.

The camera of the embodiment can provide an output signal which can be used directly by the control system to provide for safe door operation. The picture provided by the camera can also be transmitted to a remote location so that activity in the scanned region can be monitored by an observer for security or other purposes.

The proposed system provides for a number of concepts to be applied. These include the following.

'Mechanical multiplexing'- the connection and continuity of a lens in the camera is established by way of the position of the lift within the shaft, rather that by some electrical switch.

'Self selection' - the lift does not need to be instructed which lens is to be connected as this is a default outcome of the lift going to a predetermined floor.

'Automatic task prioritisation' - The sensor ends up looking at the landing of highest priority once the lift stops at any landing by default.

'Self aligning' - the positioning of the lift is critical. Conveniently the camera can be used as a sensor to achieve this alignment.

Multiplexing processes could also be applied to allow for a number of other functions to be included in the system environment. For instance for security or capacity estimation.

The sensing signals can be handled in an environment where a distributed sensor system, that is a sensor systems with multiple signal portals or front ends, are connected to a

single processing system one at a time by a switching means. The sensor system is partitioned such that minimal hardware is present and repeated at each desired floor served by the lift, whilst a singular processing system is typically located on the travelling car. This system topology allows each landing space to be scanned at critical times as if a complete system was installed at every landing, yet with the benefits of a simplified implementation.

According to another aspect of the present invention there is provided a sensor system comprising of a plurality of portals through which signals can enter the sensor environment, multiplexed into a single signal processing system so that the movement of the lift forms a mechanically multiplexed switch whereby connection and continuity of each signal path is determined by the position of the lift car within the lift shaft and at any landing the sensor environment is uniquely connected to the signal portal by mechanical alignment and signal continuity achieved by radiated or conducted means.

The embodiment is directed towards a lift control system. However it could also be readily applied to other systems and equipment where for safe operation it is necessary to establish that a particular area is, for example, not occupied or alternatively is occupied or is in some required state before the system or equipment is caused to operate. In a broad based view the proposed system requires a scanning unit which can be physically linked to one of a plurality of scanning extension units to provide an operable combination whereby a region in the vicinity of a given extension unit can be monitored to establish a characteristic of the region. The scanning unit can be displaced along a path associated with each of the extension units. The scanning unit incorporates means for converting the scanned input to an output signal for subsequent processing. Typically the system could be used for metal pressing operations, foundry operation, chemical processing, security operations and so on.

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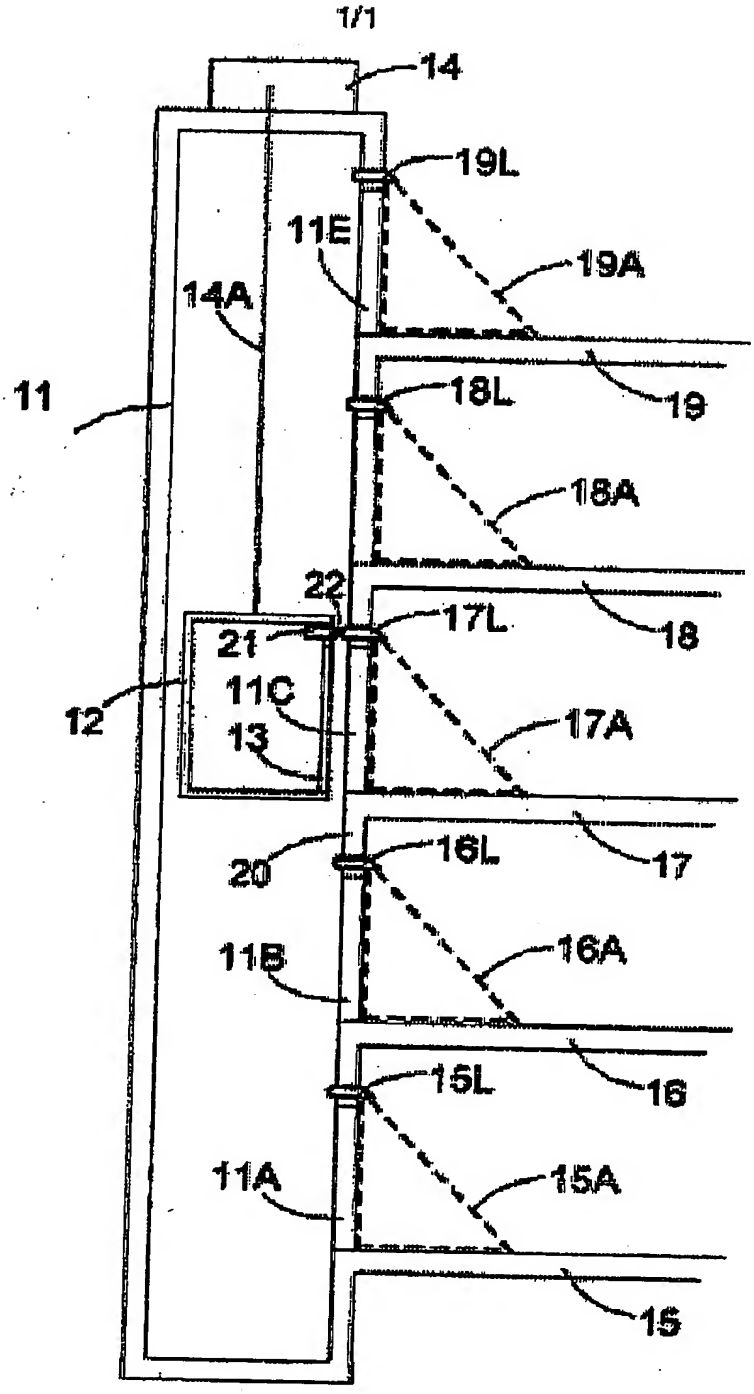
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